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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/661,211

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Gyan P. Sinha

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EXAMINER

SHUMATE, PAUL W

ART UNIT

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3693

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/661,211	Applicant(s) SINHA ET AL.	
	Examiner PAUL SHUMATE	Art Unit 3693	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7, 9-15, 17-23 and 25-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-15, 17-23, 25-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. This action is in reply to the communication filed on 01/27/2010.
2. Claims 8, 16, 24, 32 have been canceled by Applicant.
3. Claims 1-7, 9-15, 17-23, 25-31 are currently pending, have been examined, and stand rejected.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim(s) 1-5, 7-13, 15-21, 23-29, 31, and 32 rejected under 35 U.S.C. 103(a) as being unpatentable over Lange, U.S. Patent No.: 6,321,212 in view of Crouhy, Michel, Dan Galai, and Robert Mark. "A Comparative Analysis of Current Credit Risk Models." Journal of Banking & Finance 24 (2000): 59-117, hereinafter Crouhy.

As per claims 1, 9, 17, and 25, Lange teaches identifying a plurality of price buckets/states (see at least column 2 lines 1-6, column 10 lines 47-49, column 36 lines 20-26,

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and column 49 lines 6-7) calculating bucket/state transition probabilities for a security (see at least Table 3.1.7-1 and column 49 lines 5-53) estimating a bucket/state transition distribution for the security using the calculated bucket transition probabilities (see at least Table 3.1.7-1, column 2 lines 7-19, column 16 lines 24-29, column 34 lines 23-26, and column 77 lines 14-22) where the method can be adapted for bonds, along with many other financial products (see at least column 7 lines 35-40, column 23 lines 47-49, column 46 lines 34-36, and column 55 lines 20-45).

Lange does not specifically teach identifying a plurality of attributes related to a first bond, calculating one or more coefficients based on a historical data set related to the first bond, wherein the data set relates to the plurality of attributes, retrieving a plurality of values related to the first bond, or that the bucket transition probabilities are calculated based on at least the one or more coefficients and the plurality of values. The examiner interprets these limitations to substantially mean *calculating bucket/state transition probabilities for a bond based on historical data which is related to specific attributes of the bond* (instead of more generic historical data which represents statistics across a broader, more heterogeneous group of bonds) and on specific information/values related to the bond.

Crouhy teaches and compares various credit risk analysis models and Credit Value-At-Risk methodologies which are used to assess regulatory capital related to both general market risk and credit risk for trading books. The credit migration approach, as proposed by JP Morgan with CreditMetrics, is based on the probability of moving from one credit quality to another, including default, within a given time horizon. The structural approach, as initiated by KMV, is where the default process is endogenous, and relates to the capital structure of the firm. The

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actuarial approach which only focuses on default, is where default for individual bonds or loans is assumed to follow an exogenous Poisson process. CreditPortfolioView is a discrete time multi-period model where default probabilities are conditional on the macro-variables like unemployment, the level of interest rates, and the growth rate in the economy (see at least the abstract on page 59). KMV's credit risk methodology relies upon the "Expected Default Frequency", or EDF, for each issuer of a bond, rather than upon the average historical transition frequencies produced by the rating agencies for each credit class (see at least page 61). In this case, when determining the transition probabilities of a bond, one specific bond attribute taken into consideration is the specific issuer of the bond and that specific issuer's expected default frequency.

Further, Crouhy teaches that rating systems such as Moody's publish historical transition probabilities based on more than 20 years of history of firms, across all industries, which have migrated over a 1 year period from one credit rating to another. Crouhy specifically states that this data should be interpreted with care since it represents average statistics across a heterogeneous sample of firms, and over several business cycles. *For this reason many banks prefer to rely on their own statistics which relate more closely to the composition of their loan and bond portfolios* (see at least page 66).

KMV, for example, does not use Moody's or Standard & Poor's statistical data to assign a probability of default which only depends on the rating of the obligor. Instead, KMV derives the actual probability of default, the Expected Default Frequency (EDF), for each obligor based on a Merton type model of the Firm. The probability of default is thus a function of the firms capital structure, the volatility of the asset returns and the current asset value. The EDF is firm

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specific and can be mapped into any rating system to derive the equivalent rating of the obligor (see at least page 85). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to calculate bucket/state transition probabilities for a bond based on values representative of the bond and historical data that is specifically related to attributes of the bond because substantial divergences in default rates can exist within the same bond rating class and the overlap in default probability ranges may be quite large, so calculating the expected future performance of a specific bond using data which more accurately represents the bond will generally lead to more accurate bond performance predictions which helps to manage and analyze risk more efficiently (see at least pages 66, 82, and 85 in Crouhy).

Further, regarding the limitations of *simulating the transition of the first bond between the starting bucket and the plurality of price buckets using the first bucket transition distribution* and then *simulating the transition of the first bond between the plurality of price buckets*, both Lange and Crouhy teach simulating financial product state transitions in various manners including Monte Carlo Simulations (MCS) and historical simulations which simulate and analyze the risk of a financial product changing states (price performance, credit rating, etc) over certain time horizons (see at least column 11 lines 30-32, column 21 lines 64-67, column 22 lines 5-10, column 71 lines 31-37, column 77 lines 1-17 in Lange and at least page(s) 63, 69, 79, 86, 113 in Crouhy). Lange further teaches multivariate statistical distribution is typically estimated from historical time series data on the underlying events (e.g., history of prices for stocks) using correspond conventional econometric techniques and the MCS methodology involves using the estimated statistical distribution in order to simulate the representative scenarios (see at least column 77 lines 28-34) in Lange.

Regarding the limitations drawn towards *identifying a second bond from the portfolio of bonds; producing a second bucket transition distribution based on the second bond; and grouping the first bucket transition distribution and the second bucket transition distribution, thereby creating the bucket transition distribution for a portfolio of bonds*, Crouhy quite clearly teaches determining the joint migration probabilities between two different different bonds in the same portfolio in order to find the migration probabilities (bucket transition distribution) for the portfolio as a whole and even shows the resulting *joint migration* in Table 8 (see at least pages 71, 72 in Crouhy)

As per claims 2, 3, 10, 11, 18, 19, 26, and 27, Lange further teaches including exit states (see at least column 10 lines 44-50) based on default (see at least column 49 lines 6-7 and column 49 lines 49-53), call (see at least column 53 lines 42-49), and maturity date events (see at least column 45 lines 43- 44).

As per claims 4, 5, 7, 8, 12, 13, 15, 16, 20, 21, 23, 24, 28, 29, 31, and 32 Lange further teaches determining the probability that a financial product is in a particular state at a specific time (see at least column 12 lines 2-5, column 37 lines 43-45, column 54 lines 48-65, and column 114 lines 28-32) where the state is default (see at least column 49 lines 6-7 and column 49 lines 49-53) and a default rate is determined for a particular time (see at least column 49 lines 4-10 and column 79 lines 25-30). Lange further teaches running many simulations/scenarios (see at least column 77 lines 1-7 and column 82 lines 13-15) to obtain a probability distribution for a financial product or for a given group of financial products (see at least column 77 lines 49-59 and column 80 lines 23-32) which may include Monte Carlo Simulations (see at least column 77 lines 1-13) and Historical Simulations (see at least column 78 lines 3- 7).

6. Claim(s) 6, 14, 22, and 30 rejected under 35 U.S.C. 103(a) as being unpatentable over Lange in view of Crouhy further in view of Official Notice.

7. Lange does not specifically teach determining a cumulative default rate for a number of time periods by summing default balances for each of the number of time periods and dividing the sum by an average balance for a first of the number of time periods. Determining a cumulative default rate for a number of time periods is substantially the same as determining the cumulative frequency or the cumulative frequency distribution of the default state across a set number of time periods. The examiner takes Official Notice that determining the cumulative frequency of a variable across a specific range is old and well known in the field of probability theory and statistics. Further, cumulative frequency is related to frequency distribution in the same way that a cumulative distribution function (CDF) is related to a probability distribution function. Lange teaches determining the probability distribution function of a set of states throughout the disclosure. Lange also briefly teaches finding calculating a CDF (cumulative distribution function) as well (see at least column 38 line 8). Therefore it would have been obvious at the time the invention was made to someone having ordinary skill the art of risk analysis and management along with having ordinary skill in art of probability theory and statistics to include the specific limitation of determining a cumulative default rate for a number of time periods because this measure of default frequency can be used to determine whether two empirical bond transition distributions are different or whether an empirical distribution is different from an ideal distribution. Further, the cumulative distribution function can be used to check for cycles or patterns which may effect test data results.

Response to Arguments

8. Applicant's arguments filed 06/08/2009 have been fully considered but are not persuasive.

Applicant argues that Lange in view of Crouhy fails to teach or suggest *grouping the first bucket transition distribution and the second bucket transition distribution, thereby creating the bucket transition distribution for a portfolio of bonds*. The examiner respectfully disagrees and asserts that Crouhy quite clearly teaches determining the joint migration probabilities between two different different bonds in the same portfolio in order to find the migration probabilities (bucket transition distribution) for the portfolio as a whole and even shows the resulting *joint migration* in Table 8 which is the result of grouping the distributions for each bond together for a joint distribution of the portfolio (see at least pages 71, 72 in Crouhy).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Shumate whose telephone number is 571-270-1830. The examiner can normally be reached on M-F 8:30 AM - 6:00 PM, EST alt Fridays off.

10. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Kramer can be reached on 571-272-6783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Name: Paul W. Shumate
Title: Patent Examiner
Date: 6/19/2010
Signature: /Paul Shumate/
Examiner, Art Unit 3693

/James A. Kramer/
Supervisory Patent Examiner, Art Unit 3693